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Improving Shipping Safety Through the Implementation of the Ship Reporting System in Indonesian Waters

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Abstract: *Indonesia as an archipelagic country has a legal and moral responsibility in ensuring shipping safety and protection of the marine environment, especially in the strategic area of the Indonesian Archipelago Sea Channel (ALKI). This study examines the Indonesian Archipelago Sea Route (ALKI) as a strategic route in the international shipping system that not only functions as a transit route, but is also an area of state responsibility in ensuring the safety, security, and order of sea traffic. The study was carried out through literature analysis, maritime policy studies, and field surveys in several strategic locations such as the Jakarta Maritime Coordination Center (MCC), VTS Pontianak, SROP Natuna, Tanjung Mangkalihat, SROP Saumlaki, and VTS Bitung. Ship movement data based on the Automatic Identification System (AIS) is used to determine the location of the reporting line and evaluate the intensity and direction of ship traffic along ALKI. The results of this study provide recommendations regarding the determination of ship reporting locations and the appointment of shore-based authorities, taking into account infrastructure readiness, personnel competence, and the integration of communication systems between VTS and SROP units. In addition, this study emphasizes the importance of synergy between agencies and the use of information technology in supporting the efficiency and safety of national navigation. This ship reporting system is designed to be voluntary as part of a gradual strategy to achieve IMO recognition. Thus, Indonesia can strengthen its position in international shipping governance, while carrying out its role as a responsible coastal country in the ALKI region.*
Keywords: *Indonesian Archipelago Sea Channel, Ship Reporting System, UNCLOS, Epistemology, Axiology, Anthology, IMO, Navigation.*

1. INTRODUCTION

Indonesia is an archipelagic country that occupies a strategic position in the global shipping system, connecting two major oceans, the Pacific Ocean and the Indian Ocean, through more than 17,000 islands spread across its jurisdiction. This position makes Indonesia a major transit route for international shipping, as well as a coastal state with a significant responsibility for ensuring navigation safety and maritime traffic order in its waters.

Since ratifying the United Nations Convention on the Law of the Sea (UNCLOS) 1982, Indonesia has legally established the Indonesian Archipelagic Sea Lanes Passage (ALKI) as a shipping corridor that foreign vessels must traverse when crossing its territorial waters, in accordance with the right of archipelagic sea lanes passage (Archipelagic Sea Lanes Passage)

ALKI is an integral part of national jurisdiction with a strategic position in the international maritime legal framework, particularly based on the provisions of UNCLOS 1982. As an archipelagic state, Indonesia has the obligation to ensure the right of peaceful passage and transit in its waters while maintaining national sovereignty and security. ALKI is not merely a physical shipping route but also represents a mechanism for managing maritime space that systematically integrates navigation, maritime safety, and maritime traffic surveillance.

ALKI's position as a strategic corridor connecting the Indian Ocean and the Pacific Ocean makes it a key focal point in the international shipping architecture, directly impacting Indonesia's geopolitical, economic, and maritime defence and security aspects. In the context of shipping safety and security, the implementation of the Ship Reporting System (SRS) along the ALKI corridor is a strategic step to strengthen the ship traffic monitoring and control system. The SRS is an instrument that enables national navigation authorities to obtain real-time data on ship movements, identities, cargo, voyage destinations, and potential navigation risks. The implementation of this system is in line with International Maritime Organisation (IMO) standards and supports Indonesia's obligation to provide shipping safety facilities and infrastructure in accordance with international conventions such as SOLAS and MARPOL.

However, to date, Indonesian waters do not have reporting points or reporting lines that are officially listed on nautical charts, Electronic Navigational Charts (ENC), or pilot books. The absence of these elements has hindered the full effectiveness of the ship reporting system in ALKI, as there are still gaps in crucial navigational information for seafarers and maritime authorities. Yet, the presence of these elements is an essential component of an internationally standardised reporting system and serves as the primary reference in modern navigation.

In practice, the vessel reporting system can serve as the primary foundation for detecting violations of ALKI boundaries, enhancing awareness of potential security threats, and expediting the handling of incidents at sea. Field findings indicate that an integrated vessel reporting system, designed and implemented appropriately, can enhance the effectiveness of maritime surveillance and strengthen national maritime resilience. This system also enables the collection of accurate data as the basis for evidence-based policy formulation relevant to operational conditions in the field and the actual needs of maritime authorities.

In addition, SRS serves as a decision-making tool in the context of port operations and Vessel Traffic Services (VTS), including anticipating emergency situations, inspecting foreign vessels, and preventing potential collisions and marine pollution. This research provides a tangible contribution to strengthening maritime governance and institutional capacity in the maritime sector, particularly through improved inter-agency coordination, harmonisation of information systems, and the development of technical capacity in human resources in the field of navigation.

Thus, the implementation of the Ship Reporting System in Indonesian waters, particularly on the ALKI route, is a strategic step in strengthening Indonesia's position as a responsible and sovereign archipelagic nation in the maritime sector. This research is expected to serve as a basis for the formulation of national policies and as a reference in submitting the ship reporting system to the IMO for international recognition.

Previous studies have consistently shown that the success of SRS implementation is largely determined by three main factors, namely:

1. Technological infrastructure readiness, including AIS networks, radar, VTS, and maritime communication systems;
2. Human resource competence, particularly VTS operators and reporting system managers who understand international procedures;
3. Vessel compliance levels, which are greatly influenced by socialisation, incentives, and recognition of the system by the IMO.

Therefore, the implementation of the SRS in Indonesia requires a multidisciplinary approach that not only emphasises technical aspects but also encompasses policy, institutional, socio-cultural shipping, and maritime communication strategy aspects. This study will not only refer to regulations and technical guidelines but will also adopt best practices from other countries that have successfully implemented ship reporting systems effectively.

With strong bibliographic support and a comprehensive approach, this study aims to make a real contribution to the development of a National Ship Reporting System that is recognised by the IMO, while also promoting the improvement of maritime safety and protection of Indonesia's seas

2. METHOD

This study uses a combined approach between descriptive-qualitative and technical-informative methods. The goal is to describe the factual condition of the ship reporting system in Indonesia and prepare a technical design in accordance with international guidelines. The descriptive approach is used to understand the institutional, infrastructure, and human factor aspects, while the technical approach is used to design a system based on the analysis of ship traffic and operational needs. Data collection was carried out through direct observation and surveys to six strategic locations that became ship monitoring points, namely MCC Jakarta, VTS Pontianak, SROP Natuna, Tanjung Mangkalihat, SROP Saumlaki, and VTS Bitung. These locations were chosen because they represent the critical areas crossed by ALKI. In addition, the Automatic Identification System (AIS) data was collected and analyzed for three months, to identify traffic patterns, congested areas, and collision-prone points along international shipping lanes in Indonesia. Data analysis is carried out in several stages. First, traffic pattern analysis was carried out based on AIS data to identify the main shipping corridors, ship movement trends, and traffic meeting points. Second, a navigation risk assessment was carried out using the Fujii Method and IWRAP Model

(IALA) approaches to assess the level of collision risk and determine areas with intensive monitoring needs. Third, a gap analysis was carried out on the existing conditions of facilities and infrastructure in VTS and SROP, by comparing them to the minimum IMO standards based on MSC.433(98) and MSC/Circ.1060 documents.

In addition to the technical aspects, special attention was also paid to human factors through observation and limited interviews with VTS and SROP officers to assess personnel competence, interagency communication efficiency, and perception of ship reporting procedures. The human factor is crucial in ensuring that the reporting system not only runs technologically, but can also be run with professionalism, accuracy, and high awareness from the implementing officers.

All findings were synthetically analyzed to formulate a design for a ship reporting system that is feasible, sustainable, and in accordance with international standards, and can be applied gradually in Indonesian waters. This holistic approach aims to ensure that the recommendations produced are not only normative, but also applicable and relevant to the local context and national maritime needs.

3. FINDINGS AND DISCUSSIONS

This study found that the implementation of the Ship Reporting System (SRS) along the Indonesian Archipelagic Sea Lanes (ALKI) is a strategic and urgent necessity in strengthening shipping safety, monitoring foreign vessels, and protecting Indonesia's marine environment. The SRS in the ALKI not only serves as an early detection tool for potential navigation threats and emergency conditions at sea but also plays a role in strengthening Indonesia's maritime sovereignty along the busy international shipping lanes.

a. Infrastructure and Institutions

Observations at six strategic locations (MCC Jakarta, VTS Pontianak, SROP Natuna, Tanjung Mangkalihat, SROP Saumlaki, and VTS Bitung) indicate that maritime monitoring infrastructure, such as radar, AIS, and radio communication systems, is still uneven and does not fully meet IMO standards. Some critical points are not yet equipped with VTS or certified operators, and voice data recorders and other reporting devices are not yet available. In addition, the absence of a specific national policy regulating SRS has resulted in weak coordination between VTS and SROP units.

b. Human Resources and Human Factors

Human factors are crucial to the effective implementation of SRS. Field findings indicate that operators' competence in understanding international reporting procedures and the use of maritime communication systems still needs to be improved. The lack of regular training and minimal emergency simulations have resulted in low awareness of the importance of systematic and accurate ship reporting.

c. Establishment of Reporting Lines and Points

Based on vessel traffic analysis using AIS data over a three-month period, nine reporting points were established along ALKI I, II, and III. These points were selected based on traffic intensity, strategic geographical position before vessels enter Indonesian jurisdiction, and the presence of coastal monitoring facilities such as VTS and SROP. Points in the western Sunda Strait and northeastern Sulawesi were identified as important areas for early detection of foreign vessels crossing Indonesian waters. The establishment of reporting lines at the entrance to the jurisdiction is considered important to ensure that foreign vessels report their identity, position, destination, and cargo in a timely manner.

d. Standard Report Content and Communication Frequency

Every vessel crossing the ALKI is advised to report standard information, such as the vessel name, call sign, current position, time of reporting, type of cargo, and emergency conditions if any. To support this reporting, it is necessary to determine a communication channel that does not overlap (does not double) with other communication systems. The use of VHF Channel 16 for calls and Channel 12 or 14 for operational communication is adjusted according to the operational area, in accordance with IMO and IALA standards.

e. Role of Pushidrosal and Information Dissemination

It has been found that there is no established mechanism for disseminating information about this reporting system to the international shipping community. Therefore, regular reporting to Pushidrosal is required for the issuance of Notices to Mariners (NtM). These NtMs serve as official communication tools to inform shipping companies about reporting points, communication procedures, and potential navigation risks along the ALKI.

f. Maritime Economic Potential and PNBP Initiatives

In addition to safety aspects, the implementation of the SRS also opens up opportunities to promote Non-Tax State Revenue (PNBP) through administrative fees for voluntary reporting services, provided that this does not conflict with the principle of international freedom of navigation. On the other hand, the development of local economic zones and the involvement of coastal communities in community-based surveillance are recommended to strengthen the inclusiveness and sustainability of this reporting system, for example through maritime tourism villages or maritime transport service cooperatives.

g. Navigation Risk Analysis and Technical Gaps

The analysis results indicate that areas such as the Natuna waters, Makassar Strait, and Saumlaki waters have high collision and grounding risks. These risks are exacerbated by the lack of communication between ships and coastal authorities and the minimal use of standard radio channels. The gap analysis indicates that most VTS and SROP facilities do not yet meet IMO technical standards, with limitations in coastal radar, AIS, and a lack of certified operators. Weak safety culture and insufficient advanced training also pose major challenges in implementing this system.

h. Strategic Recommendations

These findings confirm that human factors play a decisive role in the success of SRS. Therefore, improving human resource capacity through regular training, international certification, and operator involvement in emergency simulations must be a key part of the SRS implementation roadmap. The government needs to develop progressive and integrated national policies, with initial reporting on a voluntary basis in accordance with IMO standards. Gradual investment in VTS technology and maritime communication networks must be accompanied by international maritime diplomacy campaigns, so that Indonesia gains global recognition and strengthens its position in global maritime safety governance.

4. CONCLUSION

This study concludes concludes that the implementation of the Ship Reporting System (SRS) in the Indonesian Archipelagic Sea Lanes (ALKI) is an urgent necessity to strengthen maritime safety and the effectiveness of monitoring foreign vessels crossing national waters. This system has proven to have the potential to provide early detection of navigation threats and emergency conditions, if effectively integrated with AIS data, monitoring technology facilities (such as VTS, radar, and voice recorders), and competent human resources in its operations.

However, to achieve optimal effectiveness, strengthening must be done not only in technical aspects but also in institutional and human resource aspects. The role of human factors is crucial, from technical training, mastery of reporting SOPs, to high awareness of safety culture. Reliable human resources will be the spearhead in the successful implementation of this system in the field. As an implementable solution, the government needs to formulate national policies that support the implementation of SRS, starting with voluntary reporting as an initial step that is more acceptable to the global shipping community. The government also needs to develop a roadmap for strengthening infrastructure and human resources, make strategic investments in the VTS system, and expand international cooperation through maritime diplomacy campaigns at the IMO. With this approach, Indonesia's SRS will not only be recognised globally but will also strengthen Indonesia's position in international shipping safety governance.

As part of the technical strategy for implementing SRS, it is necessary to clearly define reporting lines and reporting points along the ALKI I, II, and III corridors. This determination must consider vessel traffic intensity, navigation meeting points, and the presence of coastal facilities such as VTS and SROP. At each reporting point, standard report content must be defined, including:

- Vessel identity (name, IMO number, call sign),
- Position and time (current geographical coordinates),
- Route and destination of the voyage,
- Type and cargo of the vessel (especially if carrying hazardous cargo),
- Speed and heading of the vessel,
- Emergency conditions if any (engine failure, bad weather, etc.).

To support smooth communication, it is also necessary to determine the standard radio communication channel or frequency used in reporting ships to VTS/SROP, namely through VHF Channel 16 (calling) and working frequencies VHF Channel 12 or 14, depending on the respective operational areas. The use of frequencies must comply with IMO and IALA standards and be openly communicated to international shipping.

In addition to reporting to the VTS/SROP unit, this system must also include a mechanism for periodic reporting to Pushidrosal as the authority responsible for issuing Notices to Mariners (NtM). Any changes to the reporting location, frequency, or procedures must be immediately reported to Pushidrosal so that they can be officially announced to national and international shipping companies through NtM. This is important to ensure compliance and awareness of all shipping operators regarding the implemented ship reporting system.

With a structured reporting system, standardised reporting content, effective communication integration, and institutional support from agencies like Pushidrosal, the implementation of the SRS in ALKI will become a strategic tool that not only enhances navigation safety and security but also strengthens Indonesia's maritime sovereignty comprehensively.

Acknowledgment

The Government of Indonesia through the Ministry of Transportation needs to immediately establish a national policy on the implementation of the Ship Reporting System (SRS) as an integral part of the regime of shipping safety, protection of the marine environment, and pollution prevention. This policy must accommodate sustainability principles and support the implementation of international commitments such as MARPOL and the marine sector SDGs.

The government also needs to allocate priority budgets for the improvement of maritime monitoring facilities (VTS/SROP), operator training and certification, and the development of reliable marine communication systems. In addition, collaborative strategies with IMO and friendly countries need to be strengthened to gain international recognition and support for Indonesia's SRS. Furthermore, ALKI as a strategic shipping route also has the potential to develop maritime economic aspects that can encourage non-tax state revenue (PNBP). The government may consider the implementation of administrative fees for voluntary reporting or service-based marine navigation services, as long as it does not violate the principle of freedom of navigation. On the other hand, the development of local economic zones and maritime communities around ALKI also needs to be encouraged, such as the involvement of coastal communities in community-based monitoring activities, the development of maritime tourism villages, or marine transportation service cooperatives. With this approach, the implementation of SRS in ALKI will not only be an instrument of safety, but also an instrument of sustainable, inclusive, and sovereign development.

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